

In the Specification

Please delete the paragraph on page 8, beginning on line 31.

Please make the following amendments that are provided by replacement paragraphs. The replacement paragraphs are identified by page and beginning line number. Marked-up versions of the amendments to the specification follow the remarks section of this response.

The paragraph on page 3, beginning on line 27:

B1
The flag dimension of the flow tube is reduced by forming the flow tubes in a semicircle between inlet ends and outlet ends of the flow tubes. The semicircle shape of the flow tubes reduces the rise of flow tube to reduce the flag height. In order to increase the accuracy of the flowmeter, the entire length of the semicircle must vibrate.

The paragraph on page 3, beginning on line 32:

B2
A driver is affixed to the flow tubes at a position along each flow tube that is substantially perpendicular to a plane containing the inlet end and the outlet end of the flow tube. The driver is positioned at this point to minimize the amount of energy applied to the flow tubes by the driver to cause the flow tubes to oscillate. Drive signals are applied to the driver to cause the driver to oscillate the flow tubes at a low amplitude to reduce the stress applied to brace bars affixed to the flow tubes. The driver must also drive the flow tubes to vibrate at a frequency that is higher than conventional flow tubes.

The paragraph on page 7, beginning on line 6:

B3
In order to have reduced flag dimension, flow tubes 103A-103B each form a semicircle 150-150' between an inlet end 151-151' and an outlet end 152-152'. The semicircle shape of flow tubes 103A-103B reduces the flag dimension by creating a continuous curve in flow tubes 103A-103B. The semicircle shape allows flow tubes 103A-103B to be of a sufficient diameter to facilitate large flow rates of material flowing through Coriolis flowmeter 5. In order to connect flow tubes 103A-103B serially into a pipeline, inlet manifold 102 and outlet manifold 102' may have a substantially 90 degree bend in a flow path to direct flow from the pipeline into flow tubes 103A-103B.

B4
The paragraph on page 7, beginning on line 15:

To achieve zero stability and to separate vibrational modes of the flow tubes 103A-103B, a first brace bar 120 and a second brace bar 121 are affixed to flow tubes 103A and 103B. First brace bar 120 is affixed to flow tubes 103A-103B proximate inlet end 151 to connect flow tubes 103A and 103B to control oscillations of flow tubes 103A-103B. Second brace bar 121 is affixed to flow tubes 103A-103B proximate outlet end 152 to connect flow tubes 103A and 103B to control oscillations of flow tubes 103A-103B. In a preferred exemplary embodiment, first brace bar 120 and second brace bar 121 are affixed to flow tubes 103A-103B substantially 180 degrees apart from each other.

B5
The paragraph on page 7, beginning on line 24:

Driver 104 is affixed to flow tubes 103A and 103B at a position that is substantially at a midpoint between inlet 151-151' and outlet 152-152' of flow tubes 103A-103B. This position allows driver 104 to apply the greatest amount of force to flow tubes 103A-103B using the least amount of power. Driver 104 receives signals from meter electronics 20 via path 110 that cause driver 104 to oscillate at a desired amplitude and frequency. In a preferred exemplary embodiment, the frequency of a vibration is substantially equal to a first out of phase bending mode of flow tubes 103A-103B which is a higher frequency than conventional Coriolis flowmeters. In order to reduce stress from the higher frequency, it is desired to maintain a low amplitude of vibration in the preferred exemplary embodiment.

The paragraph on page 8, beginning on line 2:

In order to vibrate flow tubes 103A-103B at a high frequency and low amplitude, pick-offs 105-105' are affixed to flow tubes 103A-103B at position where the greatest amount of vibration may be sensed in flow tubes 103A-103B. This allows pick-offs 105-105' to detect the greatest amount of effect of Coriolis forces caused by the flowing material. In a preferred embodiment, the pick-offs 105-105' are positioned at a position that is substantially 30 degrees from axes w-w'. However, the pick-offs 105-105' may be placed at a position anywhere between 25 and 50 degrees from the w-w' axes when conventional electronics are used to drive the flowmeter.

The paragraph on page 8, beginning on line 12:

FIG. 2 illustrates a spacer 200 affixed to flowmeter sensor 10. Spacer 200 maintains a constant distance between inlet manifold 102 and outlet manifold 102'. Unlike conventional spacers in Coriolis flowmeters, spacer 200 is made of minimal material. Spacer 200 has square ends 190-191 on opposing sides. In a preferred exemplary embodiment, the square ends 190-191 are cast as square plates in manifolds 102-102'. Four walls represented by walls 201-204 connect each edge of square bases 190-191 to form an enclosure. Openings 210 allow flow tubes 103A-103B to protrude from spacer 200.

In the ABSTRACT

A Coriolis flowmeter sensor capable of handling large mass flow rates and having a reduced flag dimension. In order to have a reduced flag dimension, each of the flow tubes forms a semicircle between an inlet and an outlet. Brace bars, connected to the flow tubes proximate the inlet and outlet, separate the frequencies of vibration in the flow tubes. Pick-offs are positioned on the flow tubes at a position that allows the pickoffs to maximize detection of low amplitude, high frequency vibrations of the flow tubes required to have a reduced flag dimension.